

## **2002 Preliminary Report: Pallid Sturgeon Population and Habitat Survey**



**Nebraska Game and Parks Commission  
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State of Nebraska  
Game and Parks Commission  
Fisheries Division

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Pallid Sturgeon Population and Habitat Survey

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**be considered preliminary**

**Study Title:** Pallid Sturgeon Population and Habitat Survey

**Contract Number:** DACW45-01-P-0191 Option Year 2

**Research Objective:**

The objectives of this study are to:

1. Conduct a systematic, quantitative benthic trawl survey of main channel habitats of the Missouri River bordering Nebraska.
2. Document seasonal distribution and abundance by habitat type of pallid sturgeon, shovelnose sturgeon, and associated species such as sturgeon chub, sicklefin chub, and flathead chub.
3. Evaluate trawl design and trawling methodology.
4. Establish a baseline that can be used to measure the effects of restoration efforts on pallid sturgeon distribution and abundance.

**Study Area:**

The project was conducted on the Missouri River forming the border between Nebraska and South Dakota, Iowa and Missouri. For this study we divided the river into five reaches. The upper unchannelized reach extended from the Nebraska-South Dakota state line (river kilometer (rkm) 1,411) to the upper end of Lewis and Clark Lake (rkm 1,347). Lewis and Clark Lake extended from the mouth of Bazile Creek (rkm 1,347) to Gavins Pont Dam (rkm 1,308). The lower unchannelized reach extended from Gavins Point Dam (rkm 1,308) to the mouth of the Big Sioux River (rkm 1,184). The upper channelized reach extended from the mouth of the Big Sioux River (rkm 1,308) to the mouth of the Platte River (rkm 959). The lower channelized reach extended from the mouth of the Platte River (rkm 959) to the Nebraska-Kansas state line (rkm 802).

**Material and Methods**

**Benthic Trawl:**

Two types of benthic trawls were used during the 2002 sampling season. Both trawls were 2-m (6.4') wide x 0.5 m (1.6') high x 5.5 m (18') deep. The "minnow trawl" had a protective outer chafing mesh made of #15 twisted nylon twine bar netting with a mesh size of 15.875 mm (5/8"), and an inner mesh composed of 3.2 mm (1/8") delta

netting. The “sturgeon trawl” consisted of only the outer chafing of the “minnow trawl”. A footrope chain was run on both types of net to assure that the net was dragging the river bed. The nets are attached to the trawl frame using chain link connectors in five places. The trawl frame consisted of two triangular shaped skids on each end with a 2-m piece of square tubing between. Trawling was accomplished using the trawl boat from Clark Boats of Bellevue, Iowa. Trawling was conducted in large tributary mouths, deep secondary connected channels (chutes), outside bend thalweg, inside bend channel borders, sandbar pools and main channel cross overs. Trawls of approximately 300-m or less (minimum 75-m) were conducted in the unchannelized and channelized river where the habitat permitted. Latitude and longitude were recorded for each trawl at the start, midpoint and end using a twelve-channel GPS receiver. Water temperature (C), water depth (m), turbidity (secchi (cm) and water velocity (meter/sec (mps) at the bottom and 0.2 and 0.8 of the water column depth were measured and a substrate sample collected with a pipe dredge (preserved in 10% formalin). Each sample was assigned a macro and micro habitat code, any notable habitat characteristics were noted and a quick sketch was drawn. Fish collected were weighed to the nearest gram and measured to the nearest millimeter in the field, then released. All sturgeon were scanned for a pit tag, and tagged if not previously tagged.

#### **Gill Nets:**

The Standard Missouri River gill net was used during the 2002 sampling season. The multifilament gill net was 200' long x 6' deep and consisted of eight 25' panels of 1.5", 2.0", 3.0" and 4.0" mesh repeated twice along the length of the net. This net was fished in both the unchannelized and channelized reaches of the Missouri River. In the unchannelized reach of the river, the net was fished in sandbar pools parallel with the current. In the channelized reach of the river, the net was fished in the wing dike hole also parallel with the current. A hoop net hook was used to secure the net to the wing dike, then a 25' lead rope is tied to the hoop net hook and a cement block on the opposite end. The gill net leadline was tied to the block with the 1.5" mesh always fished upriver. The down stream end of the net was secured with a cement block. When water temperature was less than 10 C, the nets were fished overnight. When water temperature was greater than 10 C, the net was fished for a maximum of four hours. Latitude and longitude were recorded for each end of the net using a twelve-channel GPS receiver. Water temperature (C), water depth (m), water velocity (mps), turbidity (secchi (cm) and water velocity at the bottom and at 0.2 and 0.8 of the water column depth were measured and a substrate sample collected with a pipe dredge (preserved in 10% formalin). Each sample was assigned a macro and micro habitat code, any notable habitat

characteristics were noted and a quick sketch was drawn. Fish collected were weighed to nearest gram and measured to the nearest millimeter in the field, then released. All sturgeon were scanned for a pit tag, and tagged if not previously tagged.

#### **Trammel Nets:**

A 100' long x 6' deep multifilament trammel net was used during the 2002 sampling season. The net consisted of three panels of netting which are tied between a ½" foamcore float line and a 50 lb. lead line. The 1" inner mesh, made of 139 twine, was eight feet deep, so it hangs loosely between the six foot deep outer panels. The outer walling was 8" bar mesh, made of number 9 twine. A float and float rope were tied to each end of the trammel net for net retrieval and to help guide the net while fishing. Trammel nets were drifted for a minimum of 75 m and a maximum of 300 m. Sampling was conducted in and around large tributary confluences, deep secondary connected channels, outside bends, inside bends, and in the channel crossover. Latitude and longitude were recorded when the net was fully deployed and again when starting to be retrieved for each sample using a twelve-channel GPS receiver. Water temperature (C), water depth (m), turbidity (secchi (cm) and water velocity (meter/sec (mps) at the bottom and 0.2 and 0.8 of the water column depth were measured and a substrate sample collected with a pipe dredge (preserved in 10% formalin). Each sample was assigned a micro and macro habitat code, any notable habitat characteristics were noted and a quick sketch was drawn. Fish collected were weighed to the nearest grams and measured to the nearest millimeter in the field, then released. All sturgeon were scanned for a pit tag, and tagged if not previously tagged.

#### **Hoop Nets:**

The Standard Missouri River Hoop Net was used to sampling during 2002. The net consists of seven tapered fiberglass hoops, with two throats placed on the 2<sup>nd</sup> and 4<sup>th</sup> hoops. The entire net is made of number 15 twine tied into 1½" bar mesh. Inside bend channel boarder and steeps were sampled with hoop nets. Hoop nets were set parallel with the current along vertical underwater bank lines with hoop net hooks. Latitude and longitude were recorded for each net using a twelve-channel GPS receiver. Water temperature (C), water depth (m), turbidity (secchi (cm) and water velocity (meter/sec (mps) at the bottom and 0.2 and 0.8 of the water column depth were measured and a substrate sample collected with a pipe dredge (preserved in 10% formalin). Each sample was assigned a micro and macro habitat code, any notable habitat characteristics were noted and a quick sketch was drawn. Fish collected were weighed to the nearest grams and measured to the nearest millimeter in the field, then

released. All sturgeon were scanned for a pit tag, and tagged if not previously tagged.

## Results

### Benthic Trawls:

A total of 530 trawls were completed with the “minnow trawl” (Table 1) and 99 trawls using the “sturgeon trawl” (Table 2). Catch per unit effort (CPUE) for the “minnow trawl” ranged from 4.9 fish per trawl in the lower channelized reach of the Missouri River to 1.1 fish per trawl in the upper unchannelized reach of the Missouri River. Catch rates for the “sturgeon trawl” ranged from 1.2 fish per trawl in the lower channelized reach to 0.0 fish per trawl in the upper channelized reach. Channel catfish were the most abundant species sampled in the “minnow trawl” while shovelnose sturgeon were the most abundant species sampled with the “sturgeon trawl.” Shovelnose sturgeon were most frequently sampled in the lower unchannelized reach with a CPUE of 0.4 and were never sampled in the upper unchannelized. With the “sturgeon trawl,” shovelnose sturgeon were most frequently sampled in the lower channelized and rarely sampled in any other river segment.

Four *Macrohybopsis* species were sampled using the “minnow trawl,” with silver chubs being the most abundant and being sampled in all reaches of the river (Table 1). One hundred twenty-six speckled chubs were sampled in the channelized river, making it the second most abundant chub species. Sturgeon chubs were sampled in three river segments: lower unchannelized, upper channelized, and lower channelized. Ninety-six percent of all sturgeon chubs were sampled in the lower channelized reach, with the majority of them coming out of Hamburg chute. The least abundant was the sicklefin cub which was only sampled in the channelized reach. No flathead chubs were sampled during the 2002 field season.

Two pallid sturgeon were sampled using the “minnow trawl” and three pallid sturgeon were sampled using the “sturgeon trawl” (Table 3). The first pallid sturgeon was sampled using a “sturgeon trawl” on 29 May at Schilling Wildlife Management Area below the Platte River. The fish had a fork length of 251 mm and a weight of 15 grams. The next two pallid sturgeon were both sampled on 11 June at Schilling Wildlife Management Area using a “sturgeon trawl.” These fish had fork lengths of 262 mm and 249 mm with weights of 44 grams and 36 grams respectively. The fourth pallid sturgeon was sampled on 26 August at Schilling Wildlife Management Area using a “minnow trawl.” This fish had no tags and assumed wild. It had a fork length of 950 mm and a weight of 3,400 grams. The last pallid sturgeon was sampled with a “minnow trawl” on 22 October from the pump house hole in the Ponca Creek reach of the upper unchannelized segment. It had not been previously pit tagged, but had a red external tag. This fish had a fork length of 740 mm and weighted 566 grams. All pallid sturgeon sampled with the

“sturgeon trawl” were hatchery reared and had been previously tagged with a pit tag.

The mean fork length of shovelnose sturgeon sampled in the “minnow trawl” decreased as you moved downstream while the range of the fork lengths sampled increased (Table 4 and Figure 1). The mean fork length for the lower unchannelized reach was 555.5 mm compared to 524.5 mm and 423.6 mm for the upper channelized and lower channelized respectively. The range of fork length of shovelnose sturgeon from the lower unchannelized was only 171 mm compared to 412 mm in the upper channelized and 548 mm in the lower channelized. Weights for shovelnose sturgeon showed similar trends. Similar comparisons for the “sturgeon trawl” could not be made because of the low catch rate for shovelnose sturgeon in the unchannelized reaches. The length frequency distribution for shovelnose sturgeon collected from the lower channelized reach is presented in Figure 2.

Tributaries had the highest catch rate of macro habitats sampled with the “minnow trawl,” from the unchannelized reaches of the Missouri River with more than 15 fish per net (Table 5). However this was impacted by 397 small (less than 30 mm) channel catfish and freshwater drum that were sampled in two trawl runs around the mouth of the Big Sioux River. Inside bends, mainly sand bar pools, were the second best macro habitat for sampling fish with a catch rate of 1.5 fish per trawl. In the channelized reaches, secondary connected channels (Hamburg chute) were the most productive macro habitat with a catch rate of 11.3 fish per net. This was followed by inside bends, tributaries, and outside bends with catch rates of 4.2, 2.5 and 2.2 fish per net respectively. Two pallid sturgeons were sampled while using the “minnow trawl.” Both sturgeon were sampled on the outside bend of the river, but one in the unchannelized reach and one in the channelized reach. Most of the *Macrohybopsis* species were collected on the inside bend (90%). When sampling with a “sturgeon trawl,” no macrohabitats in the unchannelized reaches provided a catch rate of more than 0.5 fish per net (Table 6). Only eight fish were sampled in 65 trawls from the unchannelized reaches. When sampling the channelized reach, the outside bend and inside bend had the highest catch rates, 1.7 and 1.3 respectively. Almost 85% of all sturgeon sampled were collected on the outside and inside bends. Three pallid sturgeons were sampled in the channelized reach, two on the inside bend and one on the outside bend.

Table 1. Number of fish, effort (number of trawls), and total CPUE (fish per trawl) using a 2-m x 0.5-m benthic beam trawl with 3.175-mm inner mesh on the Missouri River during 2002.

Species	Upper Unchannelized	Lower Unchannelized	Upper Channelized	Lower Channelized	Lewis and Clark Lake
Pallid Sturgeon	0.01			0.01	
Shovelnose Sturgeon		0.43	0.30	0.22	0.08
Paddlefish				0.01	
Shortnose Gar				0.01	
Goldeye		0.02			
Gizzard Shad				0.01	
Speckled Chub			0.02	0.48	
Sturgeon Chub		0.02	0.04	0.34	
Sicklefin Chub			0.09	0.02	
Silver Chub	0.02	0.07	0.28	0.93	0.38
Red Shiner		0.01		0.05	
Emerald Shiner		0.01	0.04	1.43	
River Shiner				0.01	
Sand Shiner	0.01	0.07		0.02	
Common Carp	0.02			0.01	
River Carpsucker	0.04	0.03	0.04	0.02	
Quillback		0.01			
Blue Sucker		0.05	0.11	0.02	
Shorthead Redhorse	0.03		0.02		
Blue Catfish				0.03	
Channel Catfish	0.85	1.90	1.38	1.0	0.69
Flathead Catfish		0.01	0.02	0.01	
Stonecat		0.02	0.37	0.05	
White Bass				0.01	
Bluegill	0.01			0.01	
Johnny Darter	0.05				
Yellow Perch	0.02				
Sauger	0.01	0.07	0.07		
Walleye	0.03	0.09			0.31
Freshwater Drum		2.14	0.04	0.16	
Number of Fish	102	579	131	1,270	19
Effort	93	117	46	261	13
Total CPUE	1.1	4.9	2.8	4.9	1.5

Table 2. Number of fish, effort (number of trawls), and total CPUE (fish per trawl) using a 2 m x 0.5 m benthic beam trawl with 15.875 cm mesh on the Missouri River during 2002.

Species	Upper Unchannelized	Lower Unchannelized	Upper Channelized	Lower Channelized
Pallid Sturgeon				0.10
Shovelnose Sturgeon	0.02	0.03		0.97
Shortnose Gar				0.03
Grass Carp				0.03
Common Carp	0.09			
Blue Sucker				0.03
Channel Catfish	0.09			
Number of Fish	7	1	0	35
Effort	35	30	4	30
Total CPUE	0.2	< 0.1	0.0	1.2

Table 3. Sampled lake and pallid sturgeon during the 2002 sampling season.

Species	Method	Date	Location	Habitat	Tags
Lake Sturgeon	Standard Missouri River Gill Net	April 3, 2002	Nishnabotna Bend	Inside Bend – Wing Dike Hole	none
Pallid Sturgeon	Two meter beam trawl – Sturgeon Mesh	May 29, 2002	Schilling WMA	Outside Bend – Thalweg	Pit Tag – 4323236566
Pallid Sturgeon	Two meter beam trawl – Sturgeon Mesh	June 11, 2002	Schilling WMA	Inside Bend – Channel Border Dike	Pit Tag – 4310326D1E
Pallid Sturgeon	Two meter beam trawl – Sturgeon Mesh	June 11, 2002	Schilling WMA	Inside Bend – Channel Border Dike	Pit Tag – 43140E2147
Pallid Sturgeon	Standard Missouri River Trammel Net	July 1, 2002	Schilling WMA	Outside Bend – Thalweg	Pit Tag – 115676273A
Pallid Sturgeon	Two meter beam trawl – Minnow Mesh	August 26, 2002	Schilling WMA	Outside Bend – Thalweg	Pit Tag – 115527277A
Pallid Sturgeon	Two meter beam trawl – Minnow Mesh	October 22, 2002	Ponca Creek Reach	Outside Bend – Thalweg	Pit Tag – 115626456A External Tag – Red
Pallid Sturgeon	Standard Missouri River Gill Net	November 5, 2002	Schilling WMA	Inside Bend – Wing Dike Hole	Pit Tag – 424D2E4D07
Pallid Sturgeon	Standard Missouri River Gill Net	November 5, 2002	Schilling WMA	Inside Bend – Wing Dike Hole	Pit Tag – 424D6F6319

Table 4. Number of shovelnose sturgeon sampled, mean length and weight by river segment and method on the Missouri River during 2002.

River Segment	N	Mean Fork Length	Range	N	Mean Weight	Range
2 Meter Beam Trawl – Minnow Mesh						
Lower Unchannelized	50	555.5	478.0 – 649.0	50	602.4	330.0 – 1050.0
Upper Channelized	14	524.5	320.0 – 732.0	14	523.8	94.0 – 1025.0
Lower Channelized	57	423.6	126.0 – 674.0	52	418.0	8.0 – 1100.0
2 Meter Beam Trawl – Sturgeon Mesh						
Lower Channelized	29	550.8	230.0 – 657.0	26	575.7	36.0 – 828.0
Standard Missouri River Gill Net – Overnight Set						
Lower Unchannelized	374	561.3	483.0 – 767.0	374	633.1	352.0 – 1650.0
Lower Channelized	665	558.9	190.0 – 734.0	665	651.9	30.0 – 1480.0
Standard Missouri River Gill Net – 4 Hour Set						
Lower Channelized	40	572.5	481.0 – 698.0	40	693.5	348.0 – 1350.0
Standard Missouri River Drift Trammel Net						
Lower Unchannelized	22	569.2	520.0 – 690.0	22	726.9	475.0 – 1625.0
Lower Channelized	91	552.9	247.0 – 692.0	91	612	249.0 – 1150.0
Standard Missouri River Hoop Net						
Lower Channelized	36	543.3	464.0 – 647.0	36	600.3	292.0 – 1050.0

Figure 1. Length frequency distribution for shovelnose sturgeon using a 2 m x 0.5 m benthic trawl with 3.175 mm inner mesh in the lower unchannelized and lower channelized reaches of the Missouri River during 2002.

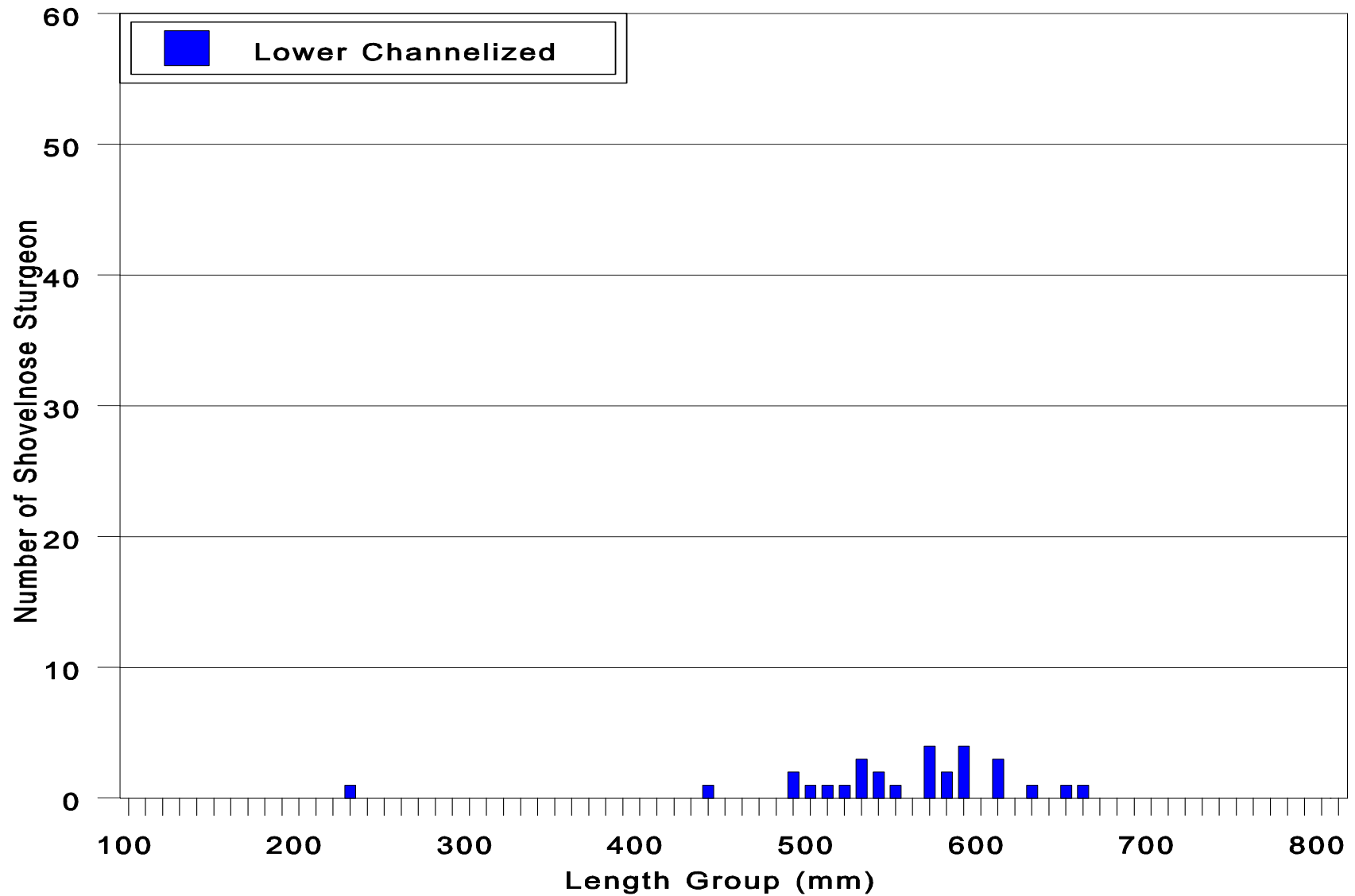
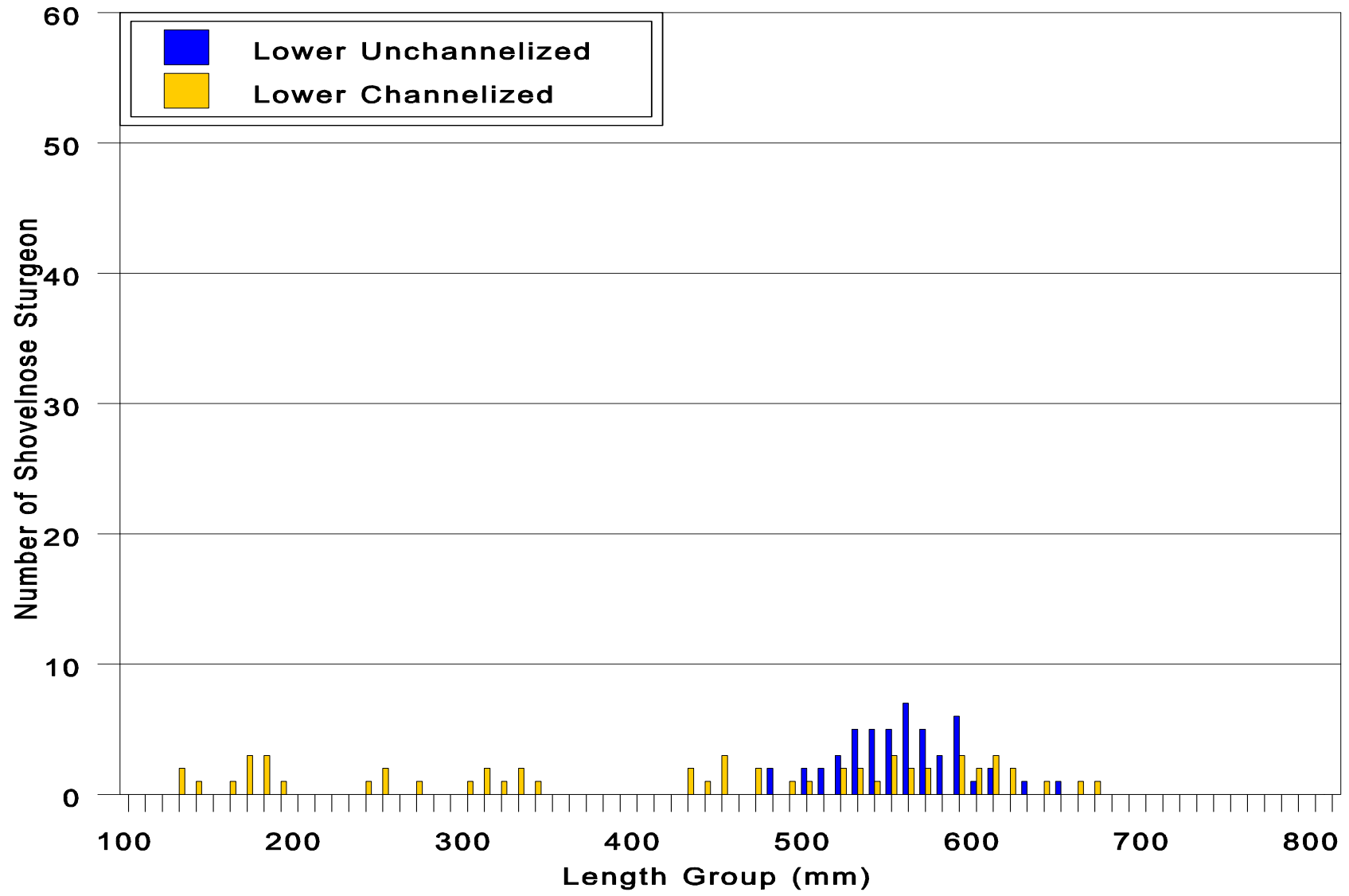


Figure 2. Length frequency distribution for shovelnose sturgeon using a 2 m x 0.5 m benthic beam trawl with 15.875 cm mesh in the lower channelized reach of the Missouri River during 2002.





Species	Unchannelized						Channelized					
	Trubutary	Inside bend	Outside bend	Secondary channel connected	Secondary channel nonconnected	Channel crossover	Trubutary	Inside bend	Outside bend	Secondary channel connected	Secondary channel nonconnected	Channel crossover
Blue Sucker	1	3	2				2	6	2			
Shorthead Redhorse	1		2					1				
Blue Catfish								7				
Channel Catfish	217	55	29			4	12	255	11	51		
Flathead Catfish		1						1	1			
Stonecat		1	2				2	8	17	3		
White Bass								2				
Bluegill		1						1				
Johnny Darter		2	3									
Yellow Perch		1	1									
Sauger	1	6	2					2				
Walleye	4	6	3									
Freshwater Drum	240	8	6				1	41		1	3	
Total	470	136	67	0	0	8	30	1,083	46	147	3	0
Effort	31	91	78	5	1	17	12	257	21	13	4	0
CPUE	15.2	1.5	0.9	0.0	0.0	0.5	2.5	4.2	2.2	11.3	0.8	0.0

Table 6. Total number of fish, effort and CPUE (fish per trawl) by macrohabitat using a 2-m benthic beam trawl with 15.875 mm mesh on the Missouri River during 2002.

Species	Unchannelized						Channelized					
	Trubutary	Inside bend	Outside bend	Secondary channel connected	Secondary channel nonconnected	Channel crossover	Trubutary	Inside bend	Outside bend	Secondary channel connected	Secondary channel nonconnected	Channel crossover
Pallid Sturgeon								2	1			
Shovelnose Sturgeon	2						5	21	3			
Shortnose Gar							1					
Grass Carp									1			
Common Carp			1			2						
Blue Sucker								1				
Channel Catfish	2		1									
Total	4	0	2	0	0	2	6	24	5	0	0	0
Effort	18	17	25	0	0	5	9	19	3	0	0	3
CPUE	0.2	0.0	0.1	0.0	0.0	0.4	0.7	1.3	1.7	0.0	0.0	0.0

**Gill Net:**

A total of 660 fish representing 13 species were sampled in the 24 gill net nights while sampling in the lower unchannelized reach of the Missouri River (Table 7). Shovelnose sturgeon were the most abundant species sampled with 15.6 fish per net, followed by goldeye and blue suckers with 5.4 and 3.3 fish per net respectively. The lower unchannelized total CPUE was 27.5 compared to 16.9 fish per net for the lower channelized. Nets were fished for 50 net nights, and sampled 845 fish representing 20 species. Shovelnose sturgeon was again the most abundant species with a CPUE of 13.3 with no other fish being caught with any consistency. One lake sturgeon and two pallid sturgeon were sampled in this reach. The lake sturgeon was sampled on 3 April in a wing dike hole on Nishnabotna Bend just above the Peru Boat Ramp. It was sampled in the upriver 2.0" mesh, approximately 35-m from the tip of the wing dike. It had a fork length of 715 mm and weighted 2,400 grams. No tag was recorded with either the pit tag reader or wand, but both pectoral fins were appeared clipped (Appendix 1). The two pallid sturgeon were both sampled on 5 November at Schilling Wildlife Management Area below the Platte River. They had fork lengths of 576 mm and 494 mm with weights of 542 grams and 204 grams respectively. The pallid sturgeon were sampled in different nets, but both captured in the downriver 2" mesh on the inside bend wing dike holes. Both fish had been previously pit tagged and assumed to be hatchery reared.

The mean fork length for shovelnose sturgeon from the lower unchannelized reach was only 2.4 mm larger than for shovelnose from the lower channelized reach (Table 4). However, the fork length range for the lower channelized was almost double that of the lower unchannelized. Shovelnose sturgeon from the lower channelized reach weighted on average 19 g more than shovelnose from the lower unchannelized and the weight range showed a similar trend to length range. The length frequency of shovelnose sturgeon sampled in the lower unchannelized and lower channelized reaches is presented in Figure 3.

When the water temperature is greater than 10 degree Celsius overnight gill net sets are not permitted. A small sample of four hour static gill net sets were tested to measure the effectiveness of this methodology to sample sturgeon. An additional 143 fish were sampled in 26 net sets (Table 8). There was a system wide catch rate of 5.5 fish per net, with a catch rate of 7.1 fish per net in the lower channelized reach. Shovelnose sturgeon and shortnose gar comprised 62% of the fish sample in this reach. The lower unchannelized and upper channelized reaches had a CPUE of 2.00 and 1.75 fish per net respectively. Four hour gill net sets caught an average of 1.1 shovelnose sturgeon per net while overnight gill net sets caught an average of 14.0 shovelnose.

When using gill nets, two inch mesh captured almost 48% of all the shovelnose sturgeon sampled, with sturgeon ranging from 190 to 720 mm (Figure 4). Out of 523 shovelnose sturgeon sampled in the 2.0" mesh, 301 came from the downriver end of the net (Figure 5). The one and a half inch mesh sampled in additional 42% of the 1,090 shovelnose sturgeon while gill netting, with a range of 390 to 730 mm. Three hundred and nineteen sturgeon were sampled in the downriver 1½" mesh compared to only 132 sturgeon in the upriver 1½" mesh. The 3.0" and 4.0" mesh only sampled 116 sturgeon, with 63% of these sturgeon coming from the downriver end.

Table 7. Number of fish, effort (number of net nights), and total CPUE (fish per net) using a standard Missouri River gill net on the Missouri River during 2002.

Species	Lower Unchannelized	Lower Channelized
Lake Sturgeon		< 0.1
Pallid Sturgeon		< 0.1
Shovelnose Sturgeon	15.6	13.3
Paddlefish	< 0.1	0.1
Longnose Gar		0.1
Shortnose Gar	< 0.1	0.2
Goldeye	5.4	0.8
Gizzard Shad		< 0.1
Grass Carp	0.1	< 0.1
Common Carp		0.1
Bighead Carp		< 0.1
River Carpsucker	0.5	0.1
Quillback	0.4	
Blue Sucker	3.3	1.0
Bigmouth Buffalo		< 0.1
Shorthead Redhorse	0.4	< 0.1
Channel Catfish	0.8	0.2
Flathead Catfish		< 0.1
Smallmouth Bass	0.3	
Sauger	0.5	0.3
Walleye	0.1	0.5
Freshwater Drum		0.1
Number of Fish	660	845
Effort	24	50
Total CPUE	27.5	16.9

Figure 3. Length frequency distribution for shovelnose sturgeon using the standard Missouri River gill net in the lower unchannelized and lower channelized reaches of the Missouri River during 2002.

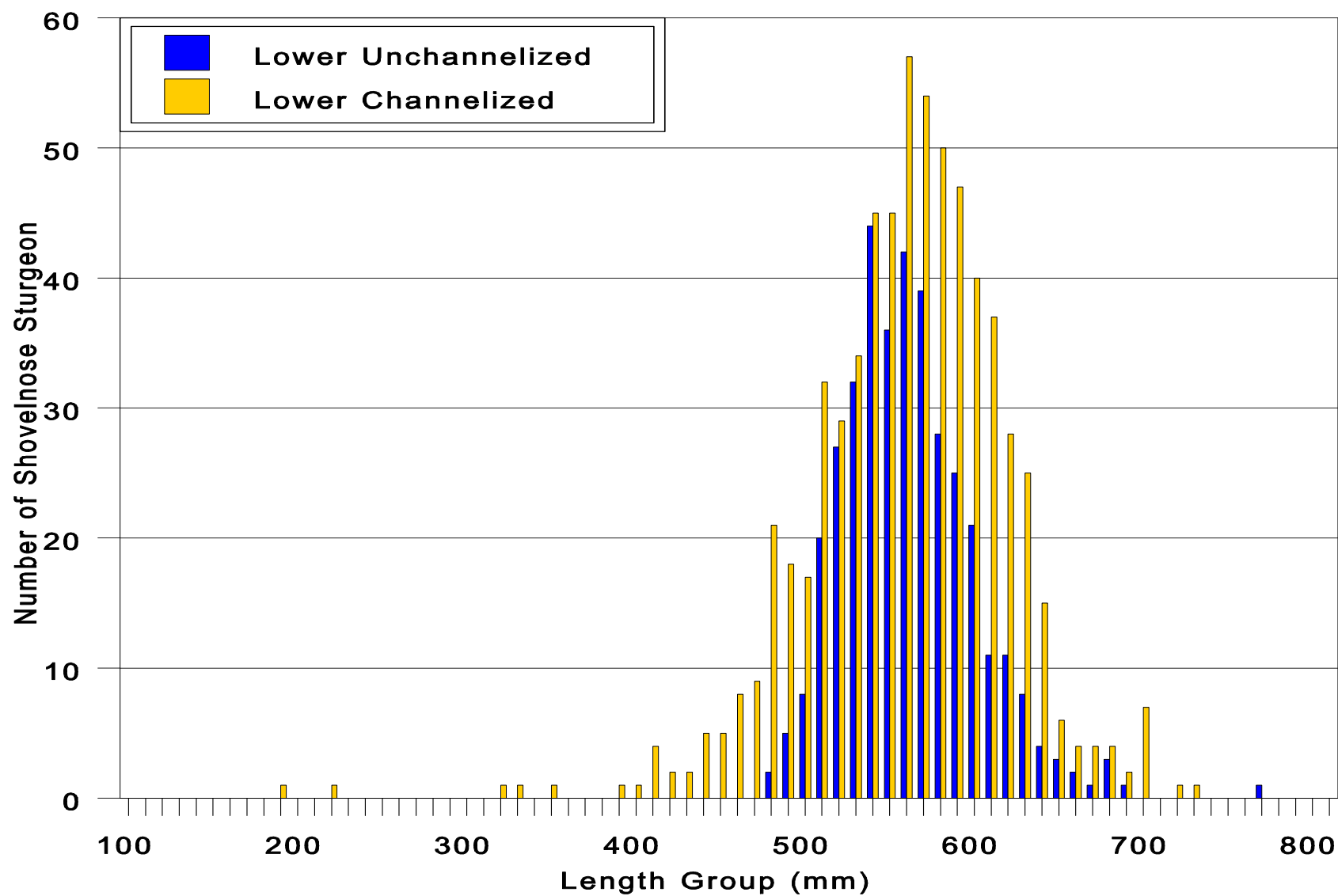




Table 8. Number of fish, effort (number of nets), and total CPUE (fish per net) using a standard Missouri River gill net for four hour net sets during 2002.

Species	Lower Unchannelized	Upper Channelized	Lower Channelized
Shovelnose Sturgeon	1.8	0.5	2.2
Longnose Gar			0.1
Shortnose Gar		0.3	2.2
Goldeye	0.3	0.8	1.2
Gizzard Shad			0.1
Common Carp			0.2
Bighead Carp			0.3
River Carpsucker			0.2
Blue Sucker			0.1
Smallmouth Buffalo			0.2
Channel Catfish			0.3
Sauger			0.1
Freshwater Drum		0.3	0.2
Number of Fish	8	7	128
Effort	4	4	18
Total CPUE	2.0	1.8	7.1

Figure 4. Length frequency distribution for shovelnose sturgeon by mesh size while using the standard Missouri River gill net during 2002.

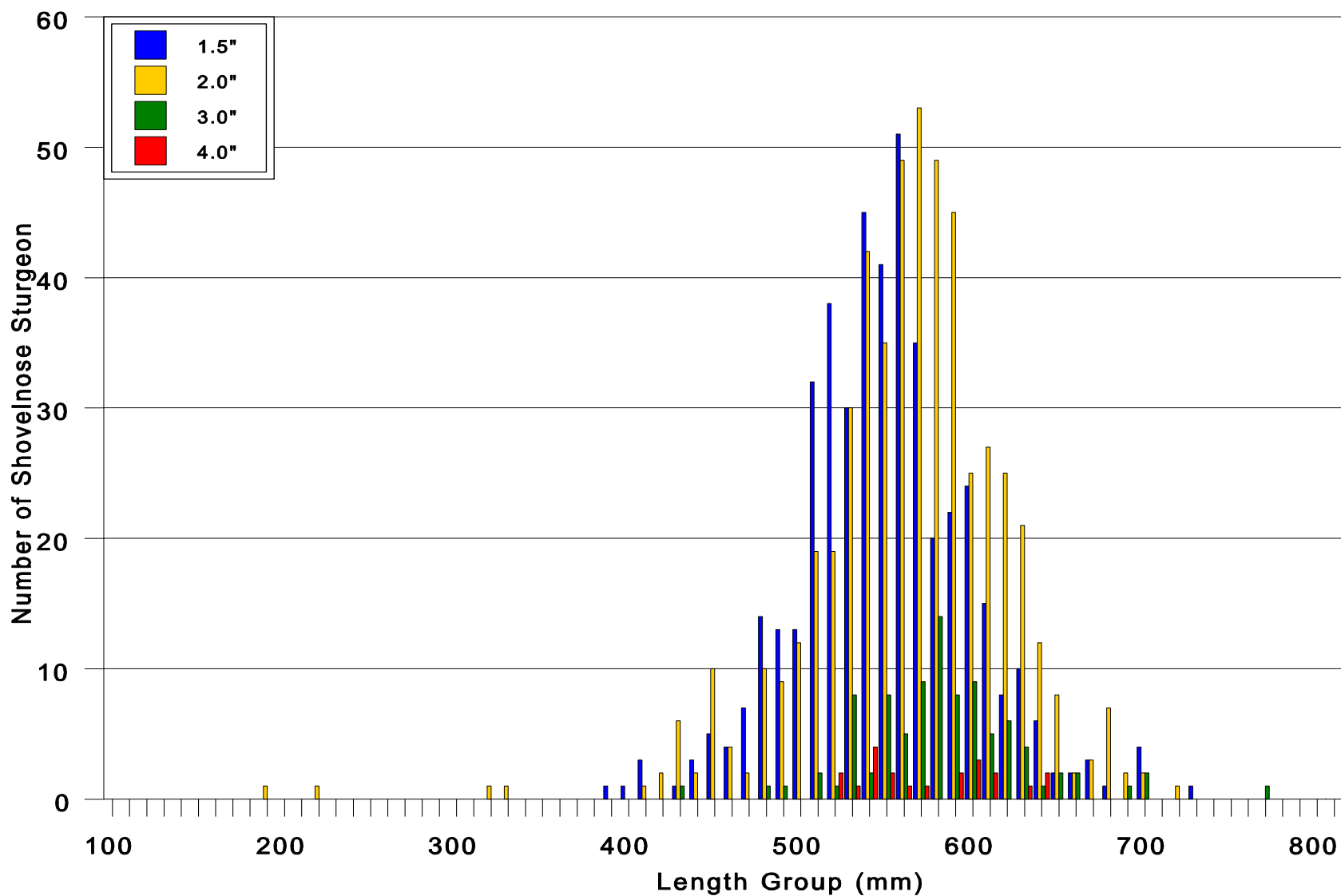
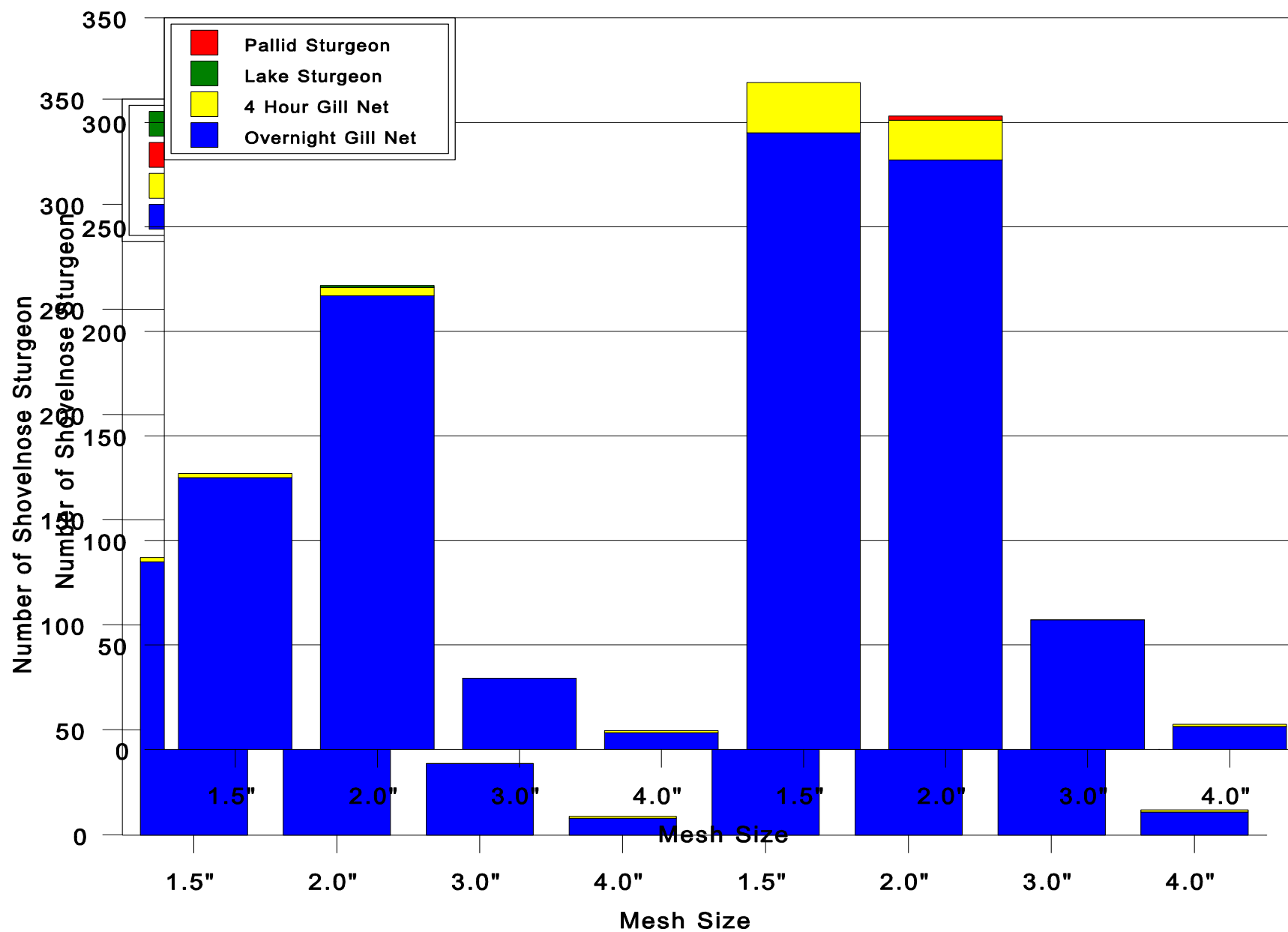


Figure 5. Catch distribution for shovelnose sturgeon by panel and mesh size while using the standard Missouri Rive gill net during 2002.





**Trammel Net:**

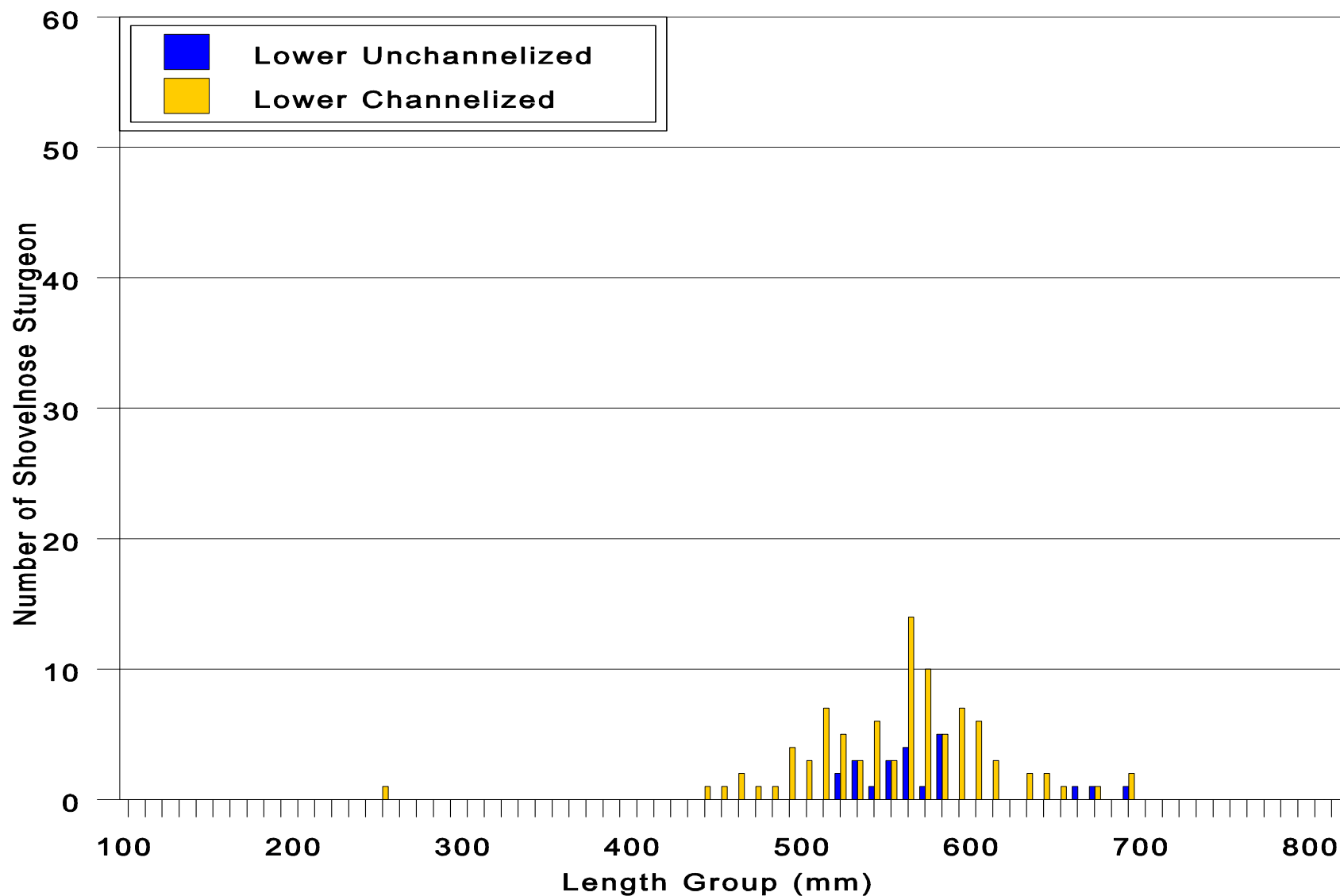
When using drifted trammel nets the lower unchannelized and lower channelized reaches had similar CPUE's with 3.9 and 3.4 fish per net respectively (Table 9). A limited effort in the upper channelized resulted in only two fish being sampled, with an overall reach catch rate of only 0.4 fish per net. Channel catfish were the most abundant species sampled in the lower unchannelized, followed by shovelnose sturgeon, goldeye and blue sucker. Shovelnose sturgeon were the most abundant species sampled in the lower channelized, with almost two fish per net, followed by bighead carp. One pallid sturgeon was sampled while drifting a trammel net below the Platte River at Schilling Wildlife Management Area. The sturgeon was sampled on 1 July and had a fork length of 700 mm and a weight of 200 grams. No pit tag or other external tags were present, so the pallid sturgeon is assumed to be wild.

Mean fork length and fork length range showed similar trends to the other sampling methods (Table 4). Shovelnose sturgeon sampled in the lower unchannelized reach were slightly larger (16.3 mm) than sturgeon sampled in the lower channelized reach. The fork length range for the lower channelized reach was more than 2.5 greater than the lower unchannelized reach (Figure 6). Weights for these shovelnose sturgeon showed the same trends as the lengths (Table 4).

Table 9. Number of fish, effort (number of nets), and total CPUE (fish per net) using a standard Missouri River drifted trammel net on the Missouri River during 2002.

Species	Lower Unchannelized	Upper Channelized	Lower Channelized
Pallid Sturgeon			< 0.1
Shovelnose Sturgeon	0.9		1.9
Shortnose Gar			0.1
Goldeye	0.7	0.4	0.1
Gizzard Shad			< 0.1
Grass Carp			< 0.1
Common Carp			< 0.1
Bighead Carp			0.6
River Carpsucker	< 0.1		
Quillback	< 0.1		
Blue Sucker	0.7		0.2
Smallmouth Buffalo	0.1		0.1
Bigmouth Buffalo			< 0.1
Shorthead Redhorse	0.1		
Channel Catfish	1.2		0.1
Green Sunfish			< 0.1
Sauger	< 0.1		
Walleye			< 0.1
Freshwater Drum			0.1
Number of Fish	97	2	159
Effort	25	5	47
Total CPUE	3.9	0.4	3.4

Figure 6. Length frequency distribution for shovelnose sturgeon using the standard Missouri River drifted trammel net in the lower unchannelized and lower channelized reaches of the Missouri River during 2002.





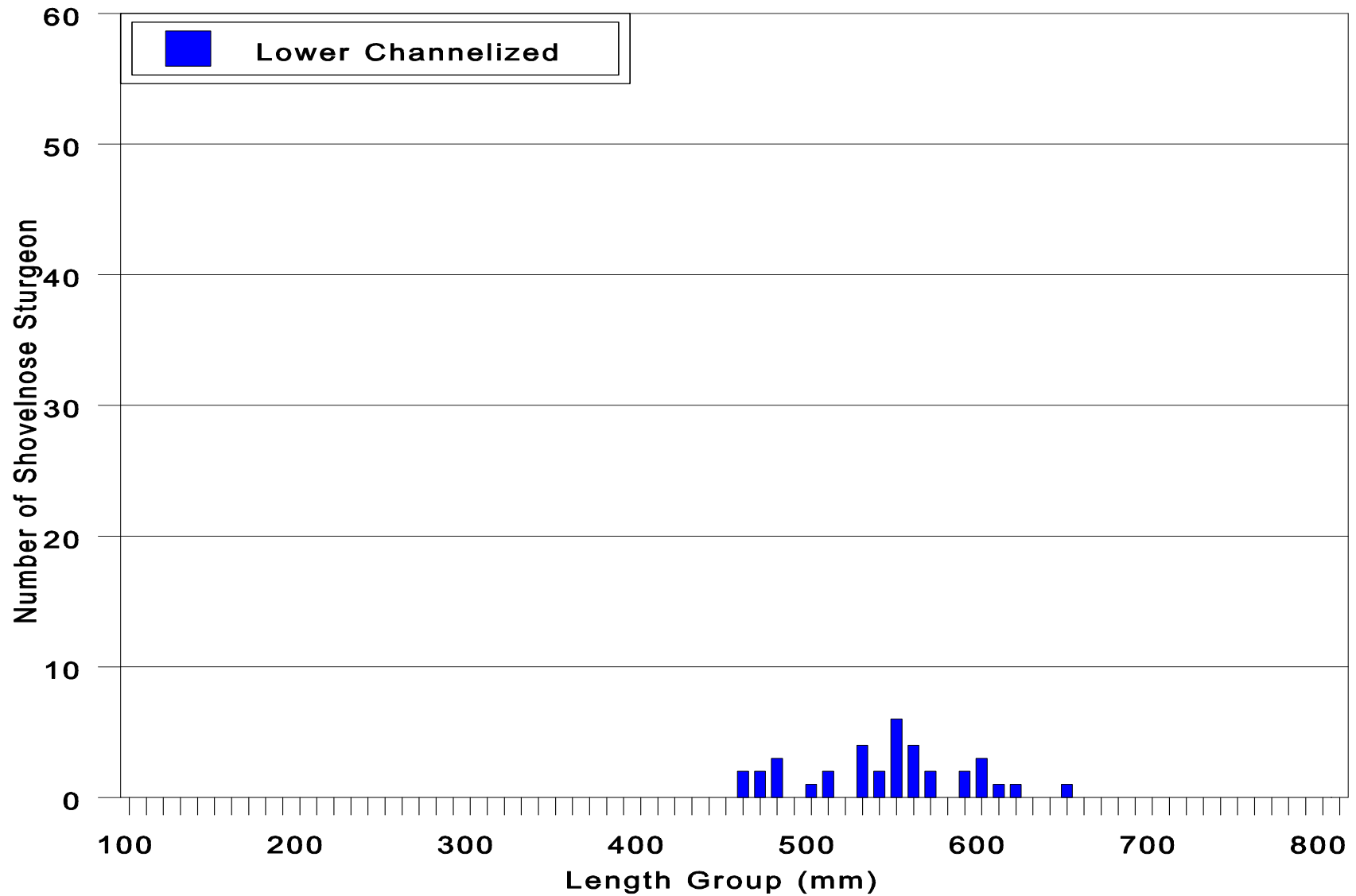
**Hoop Net:**

Hoop nets were only used for two nights resulting in 27 net nights of effort (Table 10). Sixty-nine fish representing nine species were sampled, with shovelnose sturgeon being the most abundant. CPUE for shovelnose sturgeon was 1.3 fish per net, followed by channel catfish with 0.9 fish per net. The remaining seven species were sampled at a frequency of less than 0.1 fish per net. Hoop net sampling was only performed in the lower channelized reach of the Missouri River, so length frequency distribution comparisons are not available. However, the mean fork length and mean weight for hoop net sampling was comparable to the other sampling methods (Table 4). The range of fork lengths sampled was fairly narrow with only 15 length groups being represented in a 183-mm range (Figure 7).

Table 10. Number of fish, effort (number of nets), and total CPUE (fish per net) using a standard Missouri River hoop net on the Missouri River during 2002.

Species	Lower Channelized
Shovelnose Sturgeon	1.3
Goldeye	0.1
Blue Sucker	0.1
Smallmouth Buffalo	< 0.1
Bigmouth Buffalo	< 0.1
Blue Catfish	< 0.1
Channel Catfish	0.9
Flathead Catfish	0.1
Freshwater Drum	< 0.1
Number of Fish	69
Effort	27
Total CPUE	2.6

Figure 7. Length frequency distribution for shovelnose sturgeon using the standard Missouri River hoop net in the lower channelized reach of the Missouri River during 2002.

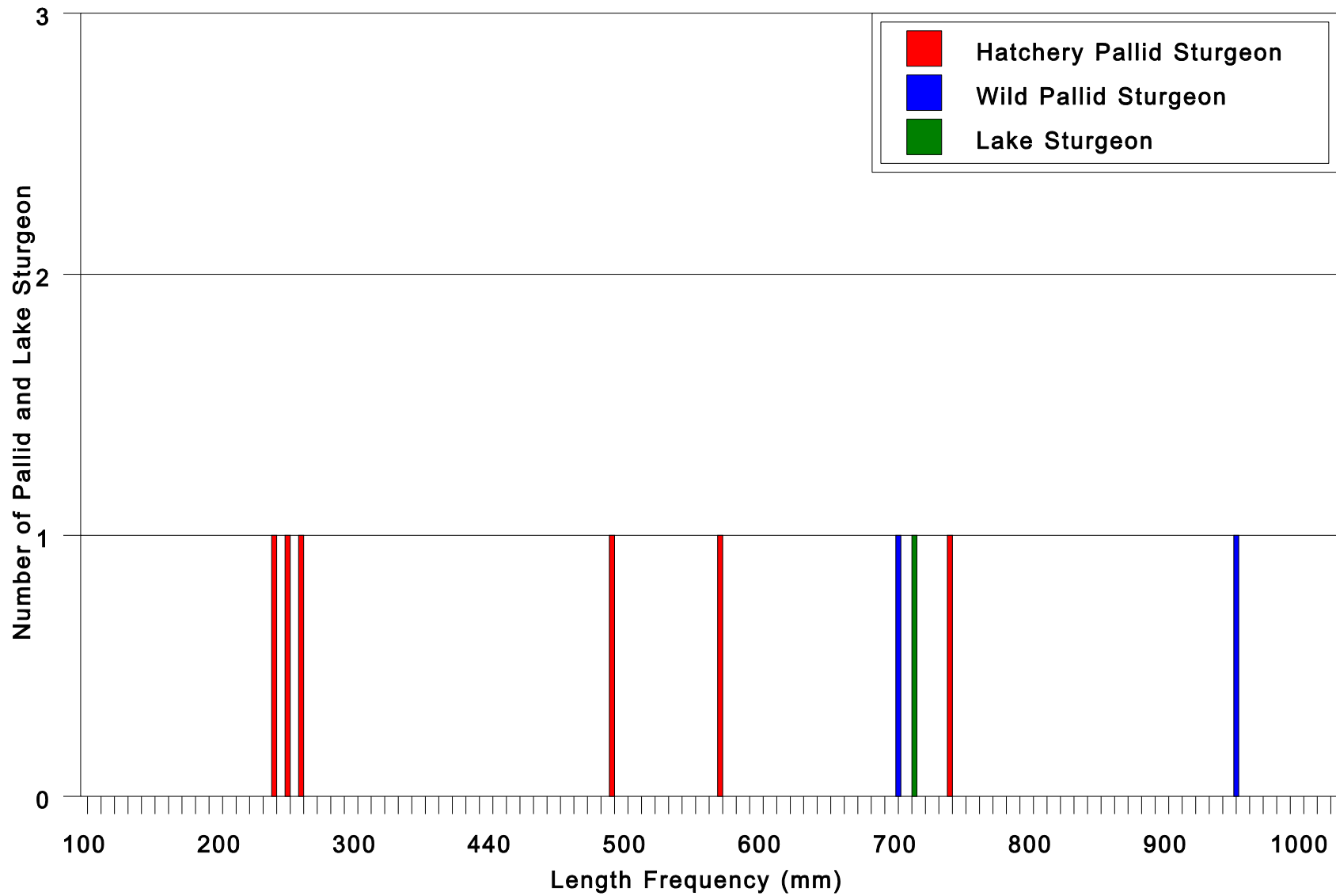




### **Pallid and Lake Sturgeon Data**

Eight pallid sturgeon and one lake sturgeon were sampled during the 2002 field season. Six of the eight pallid sturgeon were hatchery reared and had been pit tagged or had an external tag. The other two pallid sturgeon had not been pit tagged and had no external markings. One lake sturgeon was sampled during the 2002 field season. It had not been pit tagged, but both pectoral fins appeared clipped. A length frequency distribution for these fish is presented in Figure.

Figure 8. Length frequency distribution for pallid and lake sturgeon sampled during the 2002 field season.





## Discussion

While sampling with the “minnow trawl,” catch rates showed that trawling just a little faster than the current seems to provide the best catch rates. Any faster the trawl creates a wake in front of the net causing fish to be pushed away from the net. When sampling with the “sturgeon trawl,” trawling speed did not seem to have an effect on catch rates. However, when trawling at faster speeds, snags are more difficult to get the net free and the net gets more damaged. It takes very little net damage around the mouth to see a decline in catch rates, so damage nets need to be immediately repaired.

Catch rates in the upper and lower unchannelized reaches are usually lower than the catch rate in the channelized reaches. Water clarity of the unchannelized river seems to affect our catch rate. In the upper unchannelized reach secchi readings are usually greater than 1.5 m and in the lower unchannelized reach are approximately 1 m. This is compared to the average reading from the channelized river of 0.25 to 0.35 m. Fish in the unchannelized reaches perhaps can see the net coming and avoid the net. Temperature also seems to have an effect on catch success especially in the unchannelized reach. This data will be examined and reported in the final report.

Catch rates of shovelnose sturgeon were more than four times greater while using the “sturgeon net” compared to the “minnow net” in the lower channelized reach of the Missouri River, but the “sturgeon net” was fished in more specific sturgeon habitats. Also, the “sturgeon net” does not catch the associated species. A master trawl designer is going to review our current beam trawl and make suggestions to possibly improve catch rates. Greg Faulkner of Innovative Net Systems has years of experience in designing and building beam and otter trawls. He has just finished designing an otter trawl, specifically designed to sample sturgeon from the lower Missouri River, that will be used during the 2003 sampling season.

Overnight gill net sets are the most effective way to sampling sturgeon. However, the amount of organic material floating down river seems to affect catch rates. When the nets get packed with leaves, corn stocks, and other material fish seem to sense the net and avoid it.

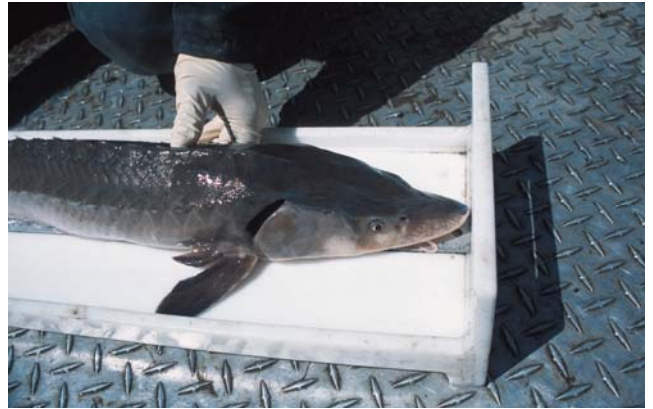
Catch rate for four hour gill net sets were low. The amount of time it takes to clean and repair a net after setting does not seem worth the effort. Drifted trammel nets and hoop nets have the ability to be effective sampling methods and more effort needs to be exerted towards these methods.

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Appendix 1 -- Pallid and Lake Sturgeon Data Sheet and Pictures











**No Pictures**











